

## PATENT COOPERATION TREATY

PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner  
 US Department of Commerce  
 United States Patent and Trademark  
 Office, PCT  
 2011 South Clark Place Room  
 CP2/5C24  
 Arlington, VA 22202  
 ETATS-UNIS D'AMERIQUE  
 in its capacity as elected Office

Date of mailing (day/month/year) 29 March 2001 (29.03.01)	
International application No. PCT/NO00/00214	Applicant's or agent's file reference P 8593
International filing date (day/month/year) 22 June 2000 (22.06.00)	Priority date (day/month/year) 12 July 1999 (12.07.99)
Applicant BAKKE, Stig	

1. The designated Office is hereby notified of its election made:



in the demand filed with the International Preliminary Examining Authority on:

30 January 2001 (30.01.01)



in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Claudio Borton Telephone No.: (41-22) 338.83.38
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From the  
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

HAMSØ PATENTBYRÅ ANS  
Box 171  
N-4302 Sandnes  
NORWAY

PCT

WRITTEN OPINION

(PCT Rule 66)

Date of mailing  
(day/month/year)

15 -06- 2001

Applicant's or agent's file reference

P 8593

REPLY DUE

within 45 days  
from the above date of mailing

International application No.

PCT/NO00/00214

International filing date (day/month/year)

22.06.2000

Priority date (day/month/year)

12.07.1999

International Patent Classification (IPC) or both national classification and IPC<sup>7</sup>

F16L 19/065

Applicant

Bakke Technology AS et al

1. This written opinion is the first (first, etc.) drawn by this International Preliminary Examining Authority.

2. This opinion contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☒ Certain observations on the international application

3. The applicant is hereby **invited to reply** to this opinion.

**When?** See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension. see Rule 66.2(d).

**How?** By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

**Also** For an additional opportunity to submit amendments, see Rule 66.4.  
For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4bis.  
For an informal communication with the examiner, see Rule 66.6.

**If no reply is filed**, the international preliminary examination report will be established on the basis of this opinion.

4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is:

12.11.2001

Name and mailing address of the IPEA/SE

Patent- och registreringsverket  
Box 5055  
S-102 42 STOCKHOLM

Facsimile No. 08-667 72 88

Telex  
17978

PATOREG-S

Authorized officer

Axel Lindhult / JA A

Telephone No. 08-782 25 00

WRITTEN OPINION

International application No.

PCT/NO00/00214

I. Basis of the opinion

1. With regard to the **elements** of the international application:\*

- ☒ the international application as originally filed
- ☐ the description:  
 pages \_\_\_\_\_, as originally filed  
 pages \_\_\_\_\_, filed with the demand  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_
- ☐ the claims:  
 pages \_\_\_\_\_, as originally filed  
 pages \_\_\_\_\_, as amended (together with any statement) under article 19  
 pages \_\_\_\_\_, filed with the demand  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_
- ☐ the drawings:  
 pages \_\_\_\_\_, as originally filed  
 pages \_\_\_\_\_, filed with the demand  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_
- ☐ the sequence listing part of the description:  
 pages \_\_\_\_\_, as originally filed  
 pages \_\_\_\_\_, filed with the demand  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language english which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☒ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the written opinion was drawn on the basis of the sequence listing:

- ☐ contained in the international application in printed form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims. Nos. \_\_\_\_\_
- ☐ the drawings. sheet/fig \_\_\_\_\_

5. ☐ This opinion has been drawn as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2 (c)).

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed".

WRITTEN OPINION

International application No.

PCT/NO00/00214

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	<u>1-6</u>	YES
	Claims	_____	NO
Inventive step (IS)	Claims	<u>3, 5, 6</u>	YES
	Claims	<u>1, 2, 4</u>	NO
Industrial applicability (IA)	Claims	<u>1-6</u>	YES
	Claims	_____	NO

2. Citations and explanations

D1: US 3248135 A  
 D2: US 3471181 A  
 D3: US 3972547 A  
 D4: US 2350017 A

The present invention relates to a connector for the connection of the end portion of a pipe. The invention also relates to a method of establishing the connection and securing the pipe end portion to said connector.

The object of the invention is to provide a connector in which the external diameter is kept as small as possible, and which exhibits, with dimensions corresponding to those of known connectors, a higher tensile and compressive strength and greater resistance towards external torques applied thereto.

Document D3 discloses a connector having features corresponding to the preamble of claim 1. Further, the cited document shows (refer to figures 12-14) a radially inner transversally shrinkable adapter sleeve (50), which is to bear, in the connected position, by its inner circumferential surface in a clamping manner against the outer jacket surface of the pipe end portion (36). The adapter sleeve has an external, threaded jacket surface (52), which is formed with a view to co-operate with a surrounding outer adapter and connector sleeve (14) with an internal, threaded circumferential surface. Said outer adapter and connector sleeve is formed to cooperate with a threaded jacket portion of a socket-like connecting element formed on an end piece (10).

.../...

WRITTEN OPINION

International application No.

PCT/NO00/00214

**Supplemental Box**

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: V.

Consequently, the subject matter of claim 1 differs from the device described in document D3 in that the external, threaded surface of the inner adapter sleeve and the internal, threaded surface of the outer adapter and connector sleeve are "...conically extending...". However, since these features are already known from similar connectors, refer to document D1, it would be obvious to a person skilled in the art to apply this knowledge to the connector according to document D3. The subject matter of claim 1, therefore, does not appear to involve an inventive step.


The features of the characterising portions of claims 2 and 4 are known from document D3. Therefore, the subject matter of these claims is not considered to involve an inventive step.

**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claim 3 is obscure by the expression "...so that the conical extent of each of said parts (16, 18 and 20) results in a sleeve wall thickness decreasing towards one end, the parts cooperating with each other two and two, in a total wall thickness essentially corresponding to one sleeve wall thickness." It has not been mentioned before in the claims that the end piece (16) has a "...conical..." surface (compare with claim 6, line 28). What is meant by "...total wall thickness..." and "...one sleeve wall thickness..." in this context is unclear.

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**PATENTBYRÅ**  
Patents, Trademarks & Designs  
Established 1950  
Member of the Association  
of Norwegian Patent Agents  
Member of the Norwegian  
Bar Association



By telefax 4 pages

Your ref:

Our ref: P 8593 mehhs

Date: 23 August 2001

Dear Sirs,

**RE: INTERNATIONAL PATENT APPLICATION NO. PCT/NO00/00214 -  
Bakke Technology AS**

In reference to a PCT Written Opinion dated 15<sup>th</sup> June, 2001, we, respectfully, submit as follows:

We have amended the claims so that Claim 1 now is restricted in view of particularly D3 as well as precisely defined with regard to both D1 and D3.

The invention distinguishes itself through the use of conical as well as threaded members. If a thread should not function, the tightening will not suffer from such malfunction.

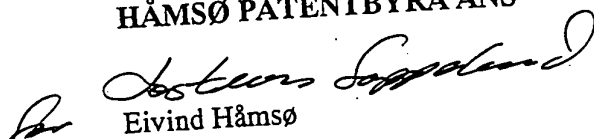
Members of the cited connectors of the kind involved have grooved parallel recesses (not threads), and they are more liable to be pulled.

Former claims 2 and 3 have been combined (new claim 2), claim 2 forming the preamble of the new sub claim. Claim 4 has been cancelled as the features thereof appear to be previously known from the cited document D3.

Thus, we enclose a set of amended Claims and hope that it receives a favourable consideration.

Yours faithfully,

**HÅMSØ PATENTBYRÅ ANS**

  
Eivind Håmsø

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## PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P 8593	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/NO00/00214	International filing date (day/month/year) 22.06.2000	Priority date (day/month/year) 12.07.1999
International Patent Classification (IPC) or national classification and IPC <sup>7</sup> F16L 19/065		
Applicant Bakke Technology AS et al		

<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>5</u> sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of <u>3</u> sheets.</p>
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the report</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input checked="" type="checkbox"/> Certain observations on the international application</p>

Date of submission of the demand  30.01.2001	Date of completion of this report  08.10.2001
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. 08-667 72 88	Authorized officer  Axel Lindhult Telephone No. 08-782 25 00



## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International Application No.

PCT/NO00/00214

## I. Basis of the report

## 1. With regard to the elements of the international application:\*

- ☐ the international application as originally filed
- ☒ the description:  
pages 1-9, as originally filed  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_
- ☒ the claims:  
pages \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, as amended (together with any statement) under article 19  
pages \_\_\_\_\_, filed with the demand  
pages 1-3, filed with the letter of 23.08.2001
- ☒ the drawings:  
pages 1-3, as originally filed  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_
- ☐ the sequence listing part of the description:  
pages \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_

## 2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language English which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☒ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

## 3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, Nos. \_\_\_\_\_
- ☐ the drawings, sheet/fig \_\_\_\_\_

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2 (c)).\*\*

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item I and annexed to this report.

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. Statement**

Novelty (N)	Claims	<u>1-4</u>	YES
	Claims	_____	NO
Inventive step (IS)	Claims	<u>2, 4</u>	YES
	Claims	<u>1, 3</u>	NO
Industrial applicability (IA)	Claims	<u>1-4</u>	YES
	Claims	_____	NO

**2. Citations and explanations (Rule 70.7)**

D1: US 3248135 A  
D2: US 3471181 A  
D3: US 3972547 A  
D4: US 2350017 A

The present invention relates to a connector for the connection of the end portion of a pipe. The invention also relates to a method of establishing the connection and securing the pipe end portion to said connector.

The object of the invention is to provide a connector in which the external diameter is kept as small as possible, and which exhibits, with dimensions corresponding to those of known connectors, a higher tensile and compressive strength and greater resistance towards external torques applied thereto.

Document D3 discloses a connector having features corresponding to the preamble of claim 1. Further, the cited document discloses (see figures 12-14) that the adapter sleeve (50) exhibits an external, threaded jacket surface (52), which is formed with a view to co-operate with a surrounding outer adapter and connector sleeve (14) with an internal, threaded circumferential surface. Said outer adapter and connector sleeve is formed to co-operate with a threaded jacket portion of a socket-like connecting element formed on an end piece (10), exhibiting a connecting device for equipment.

.../...

**Supplemental Box**

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: V.

Consequently, the subject matter of claim 1 differs from the device described in document D3 in that the external, threaded surface of the inner adapter sleeve and the internal, threaded surface of the outer adapter and connector sleeve are "...conically extending...". However, since these features are already known from similar connectors, refer to document D1, it would be obvious to a person skilled in the art to apply this knowledge to the connector according to document D3. The subject matter of claim 1, therefore, does not appear to involve an inventive step.

The features of the characterising portion of claim 3 are known from document D3. Therefore, the subject matter of said claim is not considered to involve an inventive step.

**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claim 2 is obscure by the expression "...so that the conical extent of each of said parts (16, 18 and 20) results in a sleeve wall thickness decreasing towards one end, the parts cooperating with each other two and two, in a total wall thickness essentially corresponding to one sleeve wall thickness." It has not been mentioned before in claims 1 and 2 that the end piece (16) has a "...conical..." surface (compare with claim 4, page 3, lines 15, 16). What is meant by "...total wall thickness..." and "...one sleeve wall thickness..." (page 2, lines 11, 12) in this context is unclear.

Claim 3 refers incorrectly to claim "...3...".

## A m e n d e d      c l a i m s

1. A connector (16,18,20) for the connection of the end portion of a pipe, a pipeline, a pipe string or coiled tubing (10) and formed or provided with at least one connecting device (22) for equipment/tools, preferably downhole equipment/tools, said connector (16,18,20) comprising parts (16, 18 and 20) that can be screwed together and have aligned bores for the accommodation of said pipe end portion, which is to be secured in the connector in the screwed-together condition of the parts (16, 18 and 20), said connector (16,18,20) further comprising a radially inner transversally shrinkable adapter sleeve (20), which is to bear, in the connected position, at its inner circumferential surface in a clamping manner against the outer jacket surface of the pipe end portion (10), characterized in that the adapter sleeve (20) exhibits an external, conically extending threaded jacket surface, which is formed with a view of cooperating with a surrounding outer adapter and connector sleeve (18) with an internal, conically extending threaded circumferential surface, said outer adapter and connector sleeve (18) being formed to cooperate with a threaded jacket portion of a socket-like connecting element (24) formed on an end piece (16) or similar, exhibiting said connecting device (22) for downhole equipment etc.
2. A connector according to claim 1, wherein the outer adapter and connector sleeve (18) has an axial length that exceeds the double axial length of the inner adapter sleeve (20), whose length essentially corresponds to the depth of entering/screwing of the

socket-like connecting element (24) into the outer sleeve (18), characterized in that the connector parts, which can be screwed together, in the form of the inner sleeve (20) and the socket-like connecting element (24) of the end piece (16), both have straight cylindrical bores, whereas the outer sleeve (18) has a straight cylindrical outer jacket, so that the conical extent of each of said parts (16, 18 and 20) results in a sleeve wall thickness decreasing towards one end, the parts cooperating with each other two and two, in a total wall thickness essentially corresponding to one sleeve wall thickness.

3. A connector according to claim 1, 2 or 3, characterized in that at the end located the farthest from said end piece with the socket (24), the outer sleeve (18) is formed with an inward annular flange defining a sleeve bore section of a diameter generally corresponding to the outer diameter of the coiled tubing.

4. A method of establishing the connection and securing of a pipe end portion (10) to/in a connector (16,18,20) formed in accordance with one or more of the preceding claims, characterized in that externally over a free pipe end portion (10), which is to be connected to and thereby be secured in the connector, is first passed an elongate adapter sleeve (18) with an inner surface extending longitudinally conical, defining the sleeve bore and provided with threads, after which an inner shrinkable adapter sleeve (20) with a threaded jacket surface of an externally conical extent is passed over the pipe end portion (10) and is positioned in the

longitudinal direction thereof, after which the outer adapter and connector sleeve (18) is screwed by its internally threaded circumferential surface on the external threaded portion of the inner adapter sleeve (20) and compresses the inner adapter sleeve (20) constantly more during the relative displacement of their cooperating conical surfaces in the longitudinal direction of the connector, whereby the portion of the outer sleeve (18), compressively enclosing the inner sleeve (20), is constantly decreasing in bore diameter in the screwing, at the completion of which a free internally threaded bore wall portion of the outer sleeve (18) projects axially beyond the nearest end of the shrunk inner sleeve (20), after which the connecting operation is completed in that an externally threaded, conically extending socket-like connecting element (24) of an end piece (16) included in the connector, is screwed into said free internally threaded bore wall portion of the outer sleeve (18), until the free end surfaces of the outer sleeve (18) abuts, in a movement-limiting manner, an annular stop surface (28) by said connecting element (24).

2006-06-22

PCT

## REQUEST

For receiving Office use only

PCT/NO 00 00214  
International Application No.

International Filing Date

22 JUNI 2000 (22.06.00)

Name of receiving Office and "PCT International Application"  
PATENTSTYRETApplicant's or agent's file reference  
(if desired) (12 characters maximum)

P 8593

## Box No. I TITLE OF INVENTION

Connector and method of use of the connector

## Box No. II APPLICANT

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

Bakke Technology AS  
Opstadveien 11  
N-4330 ÅLGÅRD  
NORWAY☐ This person is also inventor.

Telephone No.

Facsimile No.

Teleprinter No.

State (that is, country) of nationality:  
NORWAYState (that is, country) of residence:  
NORWAYThis person is applicant  
for the purposes of:☐ all designated  
States☒ all designated States except  
the United States of America☐ the United States  
of America only☐ the States indicated in  
the Supplemental Box

## Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

BAKKE, Stig  
Nesjaberget 9  
N-4330 ÅLGÅRD  
NORWAY

This person is:

☐ applicant only☒ applicant and inventor☐ inventor only (If this check-box  
is marked, do not fill in below.)State (that is, country) of nationality:  
NORWAYState (that is, country) of residence:  
NORWAYThis person is applicant  
for the purposes of:☐ all designated  
States☐ all designated States except  
the United States of America☒ the United States  
of America only☐ the States indicated in  
the Supplemental Box☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.

## Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf  
of the applicant(s) before the competent International Authorities as:☒ agent☐ common representative

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

HÅMSØ PATENTBYRÅ ANS  
Eivind Håmsø, Odd Skjæveland, Gunnar Håmsø,  
Arnold Østvold, Borge Håmsø,  
Jostein Soppeland  
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NORWAY

Telephone No.

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Facsimile No.

+ 47 51 66 18 96

Teleprinter No.

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

RECORD COPY



## Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

## Regional Patent

- ☒ AP ARIPO Patent: GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SL Sierra Leone, SZ Swaziland, TZ United Republic of Tanzania, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☒ EA Eurasian Patent: AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ EP European Patent: AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ OA OAPI Patent: BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line)

## National Patent (if other kind of protection or treatment desired, specify on dotted line):

- |  |  |
|--|--|
| <input checked="" type="checkbox"/> AE United Arab Emirates                  | <input checked="" type="checkbox"/> LR Liberia   |
| <input checked="" type="checkbox"/> AL Albania                               | <input checked="" type="checkbox"/> LS Lesotho   |
| <input checked="" type="checkbox"/> AM Armenia                               | <input checked="" type="checkbox"/> LT Lithuania   |
| <input checked="" type="checkbox"/> AT Austria and Utility Model             | <input checked="" type="checkbox"/> LU Luxembourg  |
| <input checked="" type="checkbox"/> AU Australia                             | <input checked="" type="checkbox"/> LV Latvia  |
| <input checked="" type="checkbox"/> AZ Azerbaijan                            | <input checked="" type="checkbox"/> MA Morocco   |
| <input checked="" type="checkbox"/> BA Bosnia and Herzegovina                | <input checked="" type="checkbox"/> MD Republic of Moldova   |
| <input checked="" type="checkbox"/> BB Barbados                              | <input checked="" type="checkbox"/> MG Madagascar  |
| <input checked="" type="checkbox"/> BG Bulgaria                              | <input checked="" type="checkbox"/> MK The former Yugoslav Republic of Macedonia                             |
| <input checked="" type="checkbox"/> BR Brazil                                |  |
| <input checked="" type="checkbox"/> BY Belarus                               | <input checked="" type="checkbox"/> MN Mongolia  |
| <input checked="" type="checkbox"/> CA Canada                                | <input checked="" type="checkbox"/> MW Malawi  |
| <input checked="" type="checkbox"/> CH and LI Switzerland and Liechtenstein  | <input checked="" type="checkbox"/> MX Mexico  |
| <input checked="" type="checkbox"/> CN China                                 | <input checked="" type="checkbox"/> NO Norway  |
| <input checked="" type="checkbox"/> CR Costa Rica                            | <input checked="" type="checkbox"/> NZ New Zealand   |
| <input checked="" type="checkbox"/> CU Cuba                                  | <input checked="" type="checkbox"/> PL Poland  |
| <input checked="" type="checkbox"/> CZ Czech Republic and Utility Model      | <input checked="" type="checkbox"/> PT Portugal  |
| <input checked="" type="checkbox"/> DE Germany and Utility Model             | <input checked="" type="checkbox"/> RO Romania   |
| <input checked="" type="checkbox"/> DK Denmark and Utility Model             | <input checked="" type="checkbox"/> RU Russian Federation  |
| <input checked="" type="checkbox"/> DM Dominica                              | <input checked="" type="checkbox"/> SD Sudan   |
| <input checked="" type="checkbox"/> EE Estonia and Utility Model             | <input checked="" type="checkbox"/> SE Sweden  |
| <input checked="" type="checkbox"/> ES Spain                                 | <input checked="" type="checkbox"/> SG Singapore   |
| <input checked="" type="checkbox"/> FI Finland and Utility Model             | <input checked="" type="checkbox"/> SI Slovenia  |
| <input checked="" type="checkbox"/> GB United Kingdom                        | <input checked="" type="checkbox"/> SK Slovakia and Utility Model  |
| <input checked="" type="checkbox"/> GD Grenada                               | <input checked="" type="checkbox"/> SL Sierra Leone  |
| <input checked="" type="checkbox"/> GE Georgia                               | <input checked="" type="checkbox"/> TJ Tajikistan  |
| <input checked="" type="checkbox"/> GH Ghana                                 | <input checked="" type="checkbox"/> TM Turkmenistan  |
| <input checked="" type="checkbox"/> GM Gambia                                | <input checked="" type="checkbox"/> TR Turkey  |
| <input checked="" type="checkbox"/> HR Croatia                               | <input checked="" type="checkbox"/> TT Trinidad and Tobago   |
| <input checked="" type="checkbox"/> HU Hungary                               | <input checked="" type="checkbox"/> TZ United Republic of Tanzania   |
| <input checked="" type="checkbox"/> ID Indonesia                             | <input checked="" type="checkbox"/> UA Ukraine   |
| <input checked="" type="checkbox"/> IL Israel                                | <input checked="" type="checkbox"/> UG Uganda  |
| <input checked="" type="checkbox"/> IN India                                 | <input checked="" type="checkbox"/> US United States of America  |
| <input checked="" type="checkbox"/> IS Iceland                               |  |
| <input checked="" type="checkbox"/> JP Japan                                 | <input checked="" type="checkbox"/> UZ Uzbekistan  |
| <input checked="" type="checkbox"/> KE Kenya                                 | <input checked="" type="checkbox"/> VN Viet Nam  |
| <input checked="" type="checkbox"/> KG Kyrgyzstan                            | <input checked="" type="checkbox"/> YU Yugoslavia  |
| <input checked="" type="checkbox"/> KP Democratic People's Republic of Korea | <input checked="" type="checkbox"/> ZA South Africa  |
|  | <input checked="" type="checkbox"/> ZW Zimbabwe  |
| <input checked="" type="checkbox"/> KR Republic of Korea                     | Check-boxes reserved for designating States which have become party to the PCT after issuance of this sheet: |
| <input checked="" type="checkbox"/> KZ Kazakhstan                            | <input checked="" type="checkbox"/> DZ - Algeria   |
| <input checked="" type="checkbox"/> LC Saint Lucia                           | <input checked="" type="checkbox"/> BZ - Belize  |
| <input checked="" type="checkbox"/> LK Sri Lanka                             | <input checked="" type="checkbox"/> AG - Antigua and Barbuda   |
|  | <input checked="" type="checkbox"/> MZ - Mozambique  |

Precautionary Designation Statement: In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation (including fees) must reach the receiving Office within the 15-month time limit.)

Box No. VI PRIORITY CLAIM		<input type="checkbox"/> Further priority claims are indicated in the Supplemental Box.		
Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:		
		national application: country	regional application: regional Office	international application: receiving Office
item (1) 12 July 1999	19993437	Norway		
item (2)				
item (3)				

☒ The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s): (1)

\* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.

#### Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA) (if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):

Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority):

Date (day/month/year)

Number

Country (or regional Office)

ISA/SE

#### Box No. VIII CHECK LIST; LANGUAGE OF FILING

This international application contains the following number of sheets:

request : 3  
description (excluding sequence listing part) : 9  
claims : 3  
abstract : 1  
drawings : 3  
sequence listing part of description : \_\_\_\_\_

Total number of sheets : 19

This international application is accompanied by the item(s) marked below:

- ☒ fee calculation sheet
- ☒ separate signed power of attorney
- ☐ copy of general power of attorney; reference number, if any:
- ☐ statement explaining lack of signature
- ☐ priority document(s) identified in Box No. VI as item(s):
- ☐ translation of international application into (language):
- ☐ separate indications concerning deposited microorganism or other biological material
- ☐ nucleotide and/or amino acid sequence listing in computer readable form
- ☒ other (specify): Copy of Off. Action of 09.02.00

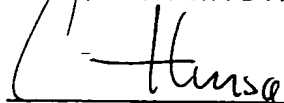
Figure of the drawings which should accompany the abstract: 1

Language of filing of the international application: Norwegian

#### Box No. IX SIGNATURE OF APPLICANT OR AGENT

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).

HÅMSØ PATENTBYRÅ ANS

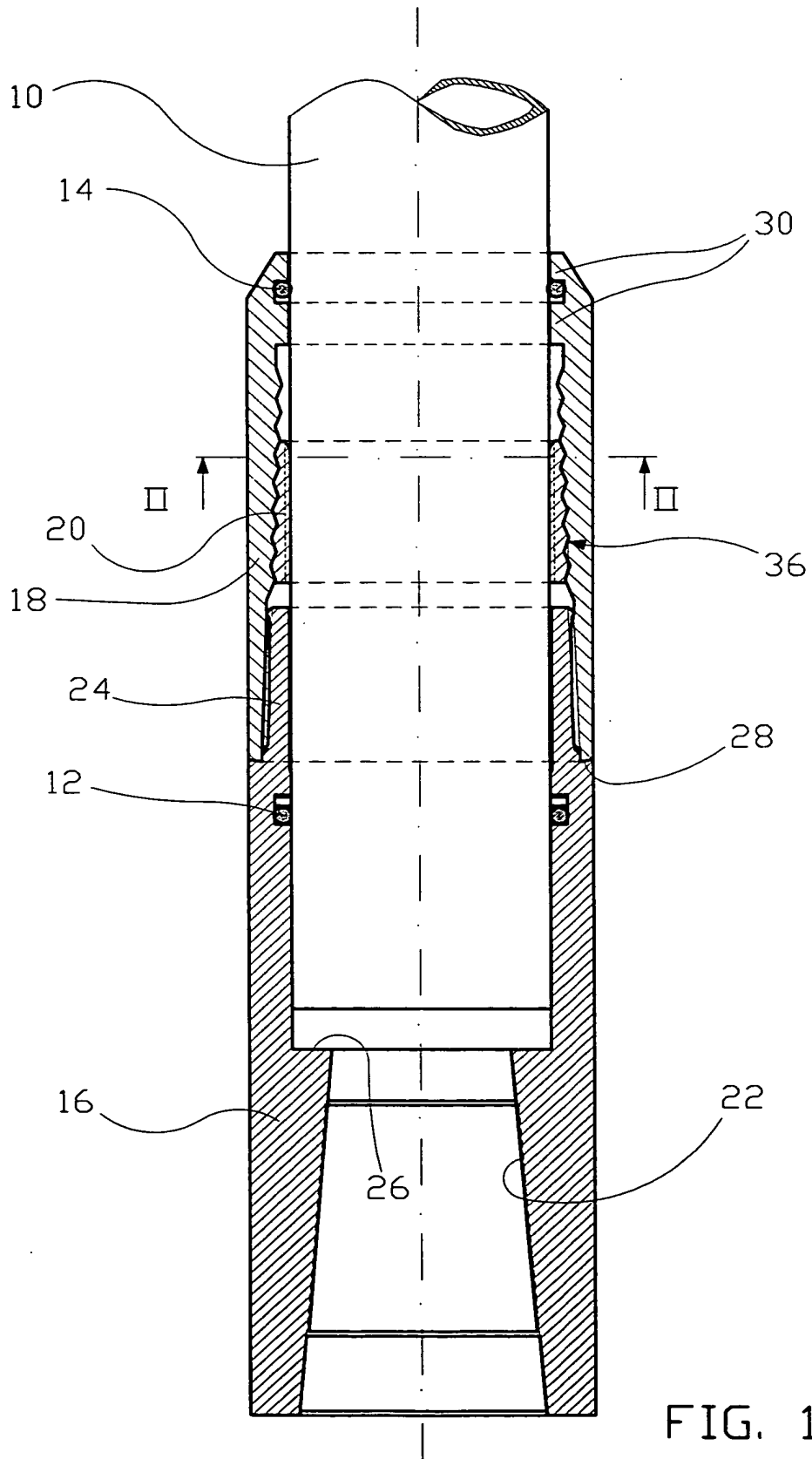


Gunnar Håmsø

For receiving Office use only	
1. Date of actual receipt of the purported international application: 22 JUNI 2000 (22.06.00)	2. Drawings: <input checked="" type="checkbox"/> received: <input type="checkbox"/> not received:
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:	
4. Date of timely receipt of the required corrections under PCT Article 11(2):	
5. International Searching Authority (if two or more are competent): ISA/SE	6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid.

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Date of receipt of the record copy by the International Bureau: 30 JUN 2000	(30.06.00)

1/3



2/3

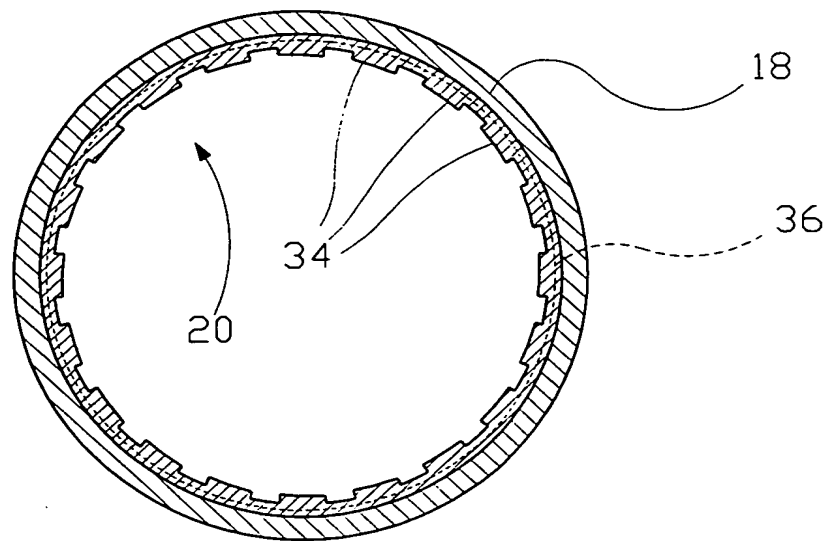


FIG. 2

3/3

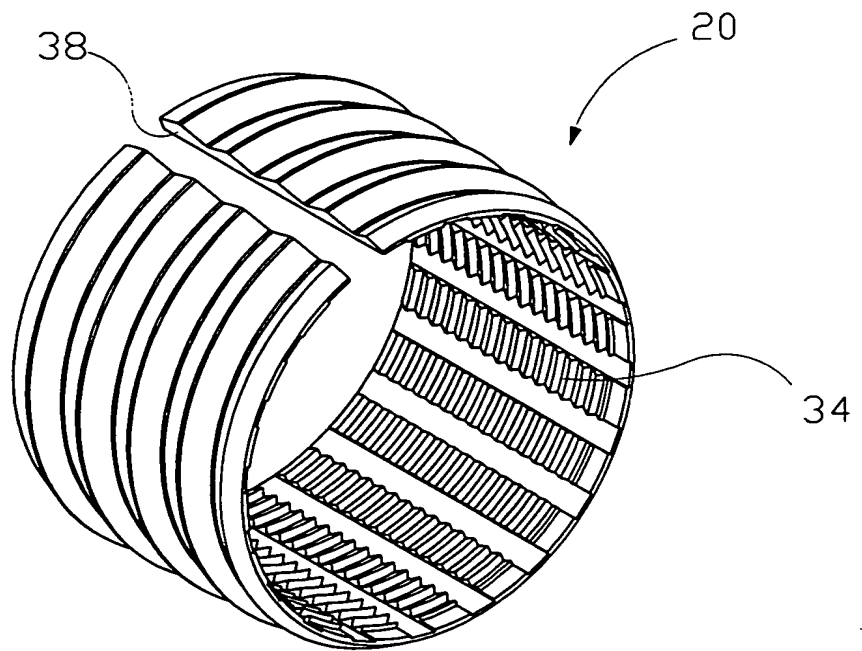
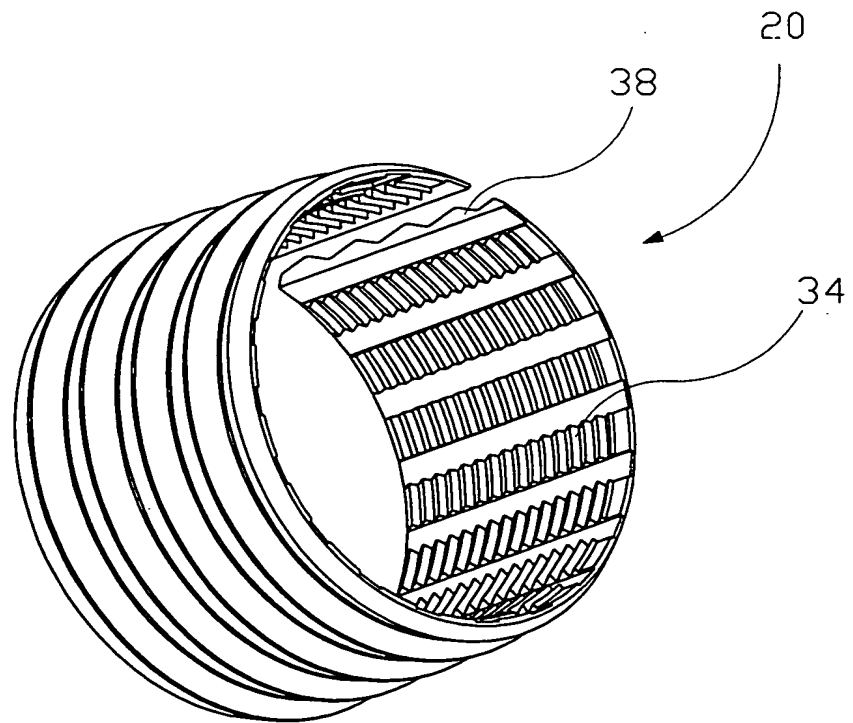


FIG. 3



# KOPLINGSANORDNING OG FREMGANGSMÅTE TIL BRUK AV KOPLINGSANORDNINGEN

Denne oppfinnelse vedrører en koplingsanordning for tilkop-  
ling av det ytre endeparti av et rør, en rørledning, en rør-  
5 streng eller et kveilirør, hvilken koplingsanordning dessuten  
er utformet for tilkopling av minst ett nedihullsutstyr, -  
verktøy etc., eksempelvis en borekrone, en drivmotor for  
samme, et måleinstrument etc. for utførelse av boring, nedi-  
hullsoperasjoner eller målinger, hvilken koplingsanordning  
10 omfatter sammenføybare deler for rørende partiets tilkopling  
og fastspenning, omfattende en indre klemhylse og en ytre  
klem- og koplingshylse som er sammenføybar med et endestyk-  
kes/koplingsstykkets tilkoplingsdel.

Oppfinnelsen vedrører likeledes en fremgangsmåte for oppret-  
15 telse av koplingen og fastspenningen av rørende partiet til  
koplingsanordningen.

For koplingsstykker for kveilirør er det av plasshensyn viktig  
å kunne holde den utvendige diameter så liten som mulig, og  
det er likeledes viktig at koplingsstykket kan tåle høy  
20 strekkbelastning, høy trykkpåkjenning og virkningen fra høye  
vridningsmomenter.

Eksisterende kopplingsanordninger av denne art omfatter normalt en klemhylse med en utvendig konisk, glatt overflate. En slik klemhylse med glatt, ikke-gjenget overflate vil medføre en stor ekspansjonskraft på en utvendig klem- og kopplingshylse som omslutter klemhylsen, når kopplingsanordningen utsettes for strekkbelastning. Dette uforelaktige forhold blir vanligvis kompensert for ved å øke kopplingens utvendige diameter, noe som også er uheldig og ufordelaktig.

En glatt konisk klemhylse i anlegg mot det omsluttete kveilerørsendeparti kan bare oppta et svært begrenset vridningsmoment.

I alminnelighet blir eksisterende kopplingsanordninger låst med settskruer som er tiltenkt oppgaven å ta opp vridningsmomenter. Dette er en særdeles uheldig konstruksjon da slike skruer er helt uegnet for en slik oppgave, og i verste fall kan de løsne gjennom vibrering og falle ut, hvorefter de løse settskruer kan gjøre skade på brønn og nedihullsutstyr.

Formålet med den foreliggende oppfinnelse har derfor vært, med enkle og billige midler, å avhjelpe eller i vesentlig grad redusere mangler, ulemper og anvendelsesbegrensninger ved tradisjonelle kopplingsanordninger av denne art og andre kjente kopplingsstykker av lignende typer, og således skaffe til veie en kopplingsanordning for angjeldende formål hvor den utvendige diameter er holdt så liten som mulig og som, ved motsvarende dimensjoner som kjente kopplingsanordninger, oppviser høyere strekk- og trykkfasthet samt større motstanddyktighet overfor tilførte ytre vridningsmomenter.

En kopplingsanordning av den art som er angitt i den innledende del av patentkrav 1, utmerker seg overfor tradisjonelle og andre kjente koplinger ved de trekk som omfattes av den karakteriserende del av patentkrav 1.

I motsetning til teknikkens standpunkt er klemhylsen i kopplingsanordningen ifølge oppfinnelsen utformet utvendig konisk og forsynt med yttergjenger (normalt venstregjenger) og på den innvendige, sylindriske flate mot kveilirøret, med friksjonsskapende ribber, fortrinnsvis i form av (høyre)gjenger.

Denne klemhylse er splittet og krympbar omkring kveilirøret ved hjelp av den ytre klem- og koplingshylse som er utformet med en til klemhylsens konisitet komplementært svarende, konisk, gjenget innerflate. Denne ytre klem- og koplingshylses hylsevegg smalner gradvis av i retning mot det i kopplingsanordningen inngående endestykke og er sammenskrubar med sistnevntes rørstusslignende tilkopplingsdel som har en til ytterhylsens konisitet komplementært motsvarende, utvendig konisk, mot den frie ende avsmalnende hylsevegg med yttergjenger.

Endestykkets rørstusslignende tilkopplingsdel har normalt en glatt sylindrisk boring med en diameter som ubetydelig overskrider kveilirørets ytterdiameter.

Ytterhylsens innvendig gjengede borings diameter overskrider i nesten hele dens lengde kveilirørets diameter, det vil si bortsett fra i et endeparti beliggende i maksimal avstand fra nevnte endestykke, hvor ytterhylsen er utformet med en ringformet, innadrettet flens med forholdsvis stor aksial utstrekning og med en diameter som bare ubetydelig overstiger kveilirørets ytre diameter.

I dette enderingflensparti er det utformet et omkretsspor som er åpent i retning radiallyt innover, og som tar imot en pakning i form av en O-ring. En annen rundtgående pakning i form av en O-ring er lagt inn i et innvendig omkretsspor som er utformet i den rørstusslignende tilkopplingsdel i en posisjon nærmere endestykket enn beliggenheten av et ringformet skulderparti som danner en stopp- og anleggsflate for ytterhylsens endeflate i sammenskrudd tilstand.



De sammenskrudde ytterdeler, en ytre klem- og koplingshylse og endestykkets rørstusslignende tilkopplingsdel vil på grunn av sine gjensidig samvirkende, komplementært koniske flater og i motsatte retninger avsmalnende hylsevegger, tilsammen  
5 oppvise minimal utvendig diameter.

Ved den indre, utvendig koniske klemhylses indre "ribber" i form av fortrinnsvis høyregjenger vil sistnevnte motsette seg forskyvning av innerhylsen og "bite seg fast" i kveilirørets overflate.

10 Den i kopplingsanordningen ifølge oppfinnelsen inngående, utvendig koniske klemhylse med ytre venstregjenger vil kunne ta opp vridningsmomenter, og tilført vridningsmoment vil stramme den indre klemhylse enda fastere mot ytre kveilirørveggflate.

15 Ved høy strekkbelastning vil ikke ekspansjonskreftene være tilsvarende høye som når den indre klemhylse ifølge kjent teknikk er glatt utvendig. Ved kompresjonskrefter vil den indre krympbare klemhylse stramme seg overfor det omsluttete parti av kveilirøret.

20 Ved kveilirørets tilkopling under dets fastspenning og sammenføyningen/-skruingen av kopplingsanordningens ulike deler under koplingens opprettelse, går man fortrinnsvis frem slik:

Den ytre klem- og koplingshylse tres inn på kveilirørsende-partiet slik at dens innadrettede ringflens med O-ringene befinner seg lengst borte fra kveilirørenden, slik at hylseveggens avsmalning mot dens frie ende er rettet i samme retning  
25 som kveilirørets frie endeparti.

Vedrørende posisjoneringen av den ytre klem- og koplingshylse på kveilirøret sørger man for at dens frie ende hvor veggtykkelsen er minst blir liggende i forholdsvis stor avstand fra  
30 kveilirørenden. Deretter tres den indre, oppsplittede, krymp-

bare, utvendig koniske klemhylse med yttergjenger inn på kveilrøret. Den indre klemhylsens innvendige høyregjenger virker som friksjonsskapende "ribber" og motvirker glidning av den indre klemhylse ved dreining/forskyvning utenpå kveilrøret (også i brukstilstand ved påvirkning fra ytre krefter).

Så skrues den ytre klem- og koplingshylse med sitt innvendig koniske, gjengede parti langs den indre klemhylses til den ytre hylses konisitet komplementært svarende utvendig koniske, gjengede flate og - etter hvert som ytterhylsens indre gjengediameter minsker -presses den indre, krympbare hylse sammen i tverretningen og overfører herunder klemkrefter fra ytterhylsen til kveilrøret som derved spennes fast. Når optimal fastspenningsgrad er oppnådd, har ytterhylsen et fra dens frie ende frittliggende (ikke i gjengeinngrep med den indre klemhylse) innvendig konisk, gjenget endeparti som - ved faringsmessig tilpasning av den indre klemhylses posisjonering i forhold til kveilrørenden i bruksstillingen - skal ha en større aksial lengdeutstrekning enn den aksiale inntrengningsdybden (innskruingsdybden) for endestykkets rørstusslignende tilkoplingsdel, som over nevnte inntrengningsdybde utvendig forløper konisk avsmalnende mot sin frie ende.

I denne posisjon skrues man endestykkets rørstusslignende tilkopplingsdel inn i ytterhylsens nevnte frittliggende, innvendig gjengede koplingsparti, inntil en rundtgående, bevegelsesbegrensende stoppskulder som avgrenser den rørstusslignende tilkopplingsdel innerst ved endestykket og fastsetter dens inntrengningsdybde i ytterhylsen.

Derved er koplingen opprettet og endestykket kan tilkoples et nedihullsutstyr, for eksempel et verktøy, en borekrone, en motor, et instrument, et måleapparat etc. hvis art ikke er gjenstand for den foreliggende oppfinnelse.

Et ikke-begrensende eksempel på en for nærværende foretrukket utførelsesform forklares i det etterfølgende under henvisning til medfølgende tegning, hvor:

Fig. 1 viser et aksialsnitt igjennom en kopplingsanordning ifølge oppfinnelsen med et deri fastspent kveilrørs ende-  
5 parti;

Fig. 2 viser et tverrgående snitt igjennom en indre og en ytre klemhylse i sammenskrudd stilling svarende til kopplings opprettelse i henhold til snittplanet II-II i fig. 1; og

10 Fig. 3 viser et perspektivriiss av nevnte indre klemhylse som er oppsplittet på langs og krympbar på tvers.

En kopplingsanordning for tilkopling av endepartiet av et rør, en rørledning, en rørstreng eller et kveilrør 10 omfatter (foruten pakninger 12 og 14 i form av O- ringer anbrakt i  
15 innvendige omkretsspor i kopplingsanordningens sammenskrubare deler 16 og 18) tre sammenskrubare deler 16, 18 og 20.

En første del som inngår i kopplingsanordningen har form av et endestykke 16 med en innvendig gjenget konisk boring 22 for tilkopling av nedihullsutstyr/-verktøy og en tilkopplingsrør-  
20 stuss 24 for kveilrøret. Tilkopplingsrørstussen 24 er utvendig konisk og forsynt med yttergjenger. Stussen 24 er innvendig sylindrisk slik at rørveggen smalner av i retning mot dens frie ende.

Endestykket 16 har en første innvendig, ringformet skulder-  
25 flate 26 som danner anslagsflate for endeflaten på kveilrøret 10. I aksial avstand fra denne innvendige, ringformede anslagsflate 26 avgrenses den utvendig koniske, gjengede rørstusslignende tilkopplingsdel 24 av en aksialt sett ytre ringformet skulderflate 28 som fastsetter tilkopplingsdelens 24

inntrengnings-/innskruingsdybde i en ytre klem- og koplingshylse 18 som utgjør koplingsanordningens andre del.

Koplingsanordningens andre del i form av en ytre klem- og koplingshylse 18 utgjøres av en innvendig konisk utformet klemhylsedel med utvendig rett sylindrisk mantelflate, slik at hylseveggen avtar suksessivt i tykkelse mot den ende som er rettet mot endestykket 16, hvorved den gjengede innervegg som avgrenser boringen igjennom den ytre klem- og koplingshylse 18, avtar i diameter i retning bort fra endestykket 16. Ved den ende som befinner seg i størst avstand fra endestykket 16, er den ytre klem- og koplingshylse 18 utformet med en innadrettet ringflens 30 hvis diameter i hovedsak svarer til kveilirørets 10 yt-terdiameter.

I dette ringflensendeparti er det innvendig utformet et rundtgående omkretsspor som opptar en første pakning i form av en O-ring 14. I en viss aksial avstand fra pakningen 14 er det i endestykket 16 innvendig utformet en omkretsspor for en andre pakning i form av en O-ring 12.

Koplingsanordningens tredje del utgjøres av en indre, utvendig konisk og gjenget klemhylse 20 som er vist i perspektiv i fig. 3, i tverrsnitt i fig. 2 og i lengdesnitt i fig. 1.

Denne indre, utvendig koniske klemhylse 20 (som innvendig oppviser rett sylindrisk boringsavgrensede innerveggsflate) har en i retning bort fra endestykket 16 avsmalnende hylsevegg.

Den indre klemhylses 20 konisitet og gjengning svarer komplementært til den ytre klem- og koplingshylsens 18 konisitet og gjengning. Det samme gjelder for den rørstusslignende tilkopplingsdelens 24 konisitet og gjengning.

Den indre klemhylse 20 har fortrinnsvis ytre venstreggjenger og kan på innsiden - som en slags ribber eller andre friksjonsskapende/forflyttingsmotvirkende fremspring overfor kveilrørets 10 overflate - være utformet med (høyre)gjenger  
5 34 som effektivt vil motsette seg glidning av den indre klemhylse 20 på kveilrøret 10 ved dreining/forskyvning (i fig 2 er kveilrøret 10 sløyet for å lette oversikten). Samvirkende gjenger på ytre og indre hylse 18, 20 er her betegnet med felles henvisningstall 36.

10 Den indre klemhylsen 20 har en gjennomgående spalte 38 som sammen med spesialutvalgt fjærstål eller lignende gjør klemhylsen 20 krympbar i tverretningen når den påføres radially-/tverrettede klemkrefter fra ytterhylsen 18 som følge av relativ forskyvningsbevegelse mellom innbyrdes anliggende  
15 koniske flater.

Ved tilkoplingen av kveilrørets 10 endeparti, det vil si det ytterparti som i aksialretningen får plass inne i koplingsanordningen, med endeflaten på kveilrøret 10 i anlegg mot den aksialt innerst beliggende, ringformede anslagsflate 26.

20 Den ytre klem- og koplingshylse 18 skyves først inn på kveilrøret 10 fra dettes frie ende inntil denne ytterhylse 18 inntar en posisjon langs kveilrøret 10 hvor dens venstre ende med minimal hylseveggtykkelse, befinner seg i en aksial avstand fra tilkoplingsrørstussens 24 ytre, frie ende som over-  
25 skrider den indre klemhylses 20 aksiale lengdeutstrekning.

Deretter skyves den indre, splittede, radially krympbare klemhylse 20, som anbringes i en utgangsstilling med sin venstre ende i passe (erfaringen vil avsløre hvor meget denne indre klemhylse kan forventes å bli forflyttet aksialt under den  
30 ytre klemhylses forflyttingsbevegelse mot venstre under dens koniske innvendige gjengers inngrep i og forskyvning langs den indre klemhylses 20 samvirkende koniske yttergjenger mens ytterhylseboringsens stadig minskende diameter bevirker en ra-

dial sammenpressing, tverrgående "krymping" av den indre klemhylse hvis klemkrefter sikrer fastspenning av det omsluttete, ringformede kveilirørparti.

Det forutsettes at den indre klemhylse 20 fastspennes og sikres i en posisjon, hvor dens ifølge fig. 1 venstre ende befinner seg i en aksial avstand fra den ytre klem- og kopplingshylses 18 venstre ende som overstiger den effektive aksiale lengde av tilkopplingsstussen 24, slik at denne nå kan skrues inn i det frittliggende (uten radialt innenforliggende indre klemhylse 20) endeparti, inntil sistnevntes frie endeplate støter bevegelsesavsluttende mot den aksialt sett ytre, ringformede anslagsflate 28 på endestykket 16 og som avgrenser inntrengnings-/innskruingsdybden for den utvendig koniske, gjengede tilkopplingsstussen 24. Derved er koplingen opprettet.

## p a t e n t k r a v

1. Kopplingsanordning (16,18,20) for tilkopling av ende-  
partiet av et rør, en rørledning, en rørstreng eller et  
kveilrør (10) og utformet med henholdsvis tilordnet minst  
5 en tilkopplingsinnretning (22) for utstyr/verktøy, for-  
trinnsvis nedihullsutstyr/-verktøy, hvilken kopplings-  
anordning (16,18,20) omfatter sammenskrubare deler (16,  
18 og 20) med ifluktliggende boringer for opptagelse av  
nevnte rørendeparti som skal spennes fast i kopplingsan-  
10 ordningen i delenes (16, 18 og 20) sammenskrudde til-  
stand, k a r a k t e r i s e r t v e d at en radialt  
indre, i tverretningen krympbar klemhylse (20) som i kop-  
lingsstillingen, med sin indre omkretsflate skal ligge  
fastklemmende an mot rørendepartiets (10) ytre mantel-  
15 flate, har en utvendig, konisk forløpende, gjenget man-  
telflate som er utformet med henblikk på å samvirke med  
en utenpåliggende, ytre klem- og kopplingshylse (18) med  
en innvendig, konisk forløpende, gjenget omkretsflate,  
hvilken ytre klem- og kopplingshylse (18) er utformet til  
20 å samvirke med et gjenget mantelparti på en rørstusslig-  
nende tilkopplingsdel (24) utformet på et endestykke (16)  
eller lignende som oppviser nevnte tilkopplingsinnretning  
(22) for nedihullsutstyr etc.
2. Kopplingsanordning ifølge krav 1, k a r a k t e r i -  
25 s e r t v e d at den ytre klem- og kopplingshylse (18)  
har en aksial lengde som overskrider den dobbelte aksiale  
lengde av den indre klemhylse (20), hvis lengde i det  
vesentlige svarer til den rørstusslignende tilkopplings-  
dels (24) inntrengnings-/innskruingsdybde i ytterhylsen  
30 (18).
3. Kopplingsanordning ifølge krav 1 eller 2, k a r a k -  
t e r i s e r t v e d at kopplingsanordningens sammen-  
skrubare deler i form av indre hylse (20) og rørstuss-

lignende tilkopplingsdel (24) på endestykket (16) begge har rett sylindrisk boring, mens ytre hylse (18) har rett sylindrisk yttermantel, slik at hver av nevnte delers (16, 18 og 20) koniske forløp resulterer i en mot én ende minskende hylseveggtykkelse og der de parvis samvirker med hverandre, i en samlet veggtykkelse som i det vesentlige svarer til én hylseveggtykkelse.

4. Kopplingsanordning ifølge krav 1, 2 eller 3, k a r a k -  
t e r i s e r t v e d at ytterhylsen (18) ved den ende  
som befinner seg lengst borte fra nevnte endestykke med  
rørstussen (24), er utformet med en innadrettet, ringfor-  
met flens som avgrenser et hylseboringsavsnitt med en  
diameter stort sett svarende til kveil-rørets ytre diame-  
ter.
5. Kopplingsanordning ifølge krav 1, 2, 3 eller 4, k a -  
r a k t e r i s e r t v e d at den indre, krympbare  
klemhylse (20) har en gjenget, fortrinnsvis høyregjenget  
innvendig omkretsflate, hvilke gjenger er utformet med  
henblikk på å motvirke den indre klemhylses (20) glid-  
ning, dreining og/eller forskyning på rørendepartiet  
under og etter kopplingens opprettelse.
6. Fremgangsmåte til opprettelse av et rørendepartis (10)  
tilkoppling og fastspenning i en kopplingsanordning  
(16,18,20) utformet i overensstemmelse med ett eller  
flere av de foregående krav, k a r a k t e r i s e r t  
v e d at det utenpå et fritt rørendeparti (10) som skal  
koples til og herunder spennes fast i kopplingsanordnin-  
gen, først tres inn en langstrakt klemhylse (18) med en i  
lengderetningen konisk forløpende innerflate som avgren-  
ser hylseboringen og er forsynt med gjenger, hvoretter en  
indre, krympbar klemhylse (20) med en utvendig konisk  
forløpende, gjenget mntelflate tres inn utenpå rørende-  
partiet (10) samt posisjoneres i dettes lengderetning,  
hvoretter den ytre klem- og kopplingshylse (18), med sin



innvendig gjengede omkretsflate skrues inn på den indre klemhylses (20) utvendige gjengeparti og presser den innvendige klemhylse (20) stadig mer sammen under deres samvirkende koniske flaters relative forskyvning i kopplingsanordningens lengderetning, hvor det parti av ytterhylsen (18) som pressende omslutter innerhylsen (20) stadig minsker i boringsdiameter under forskruingen, ved hvis avslutning et fritt, innvendig gjenget boringsveggsparti av ytterhylsen (18) rager aksialt frem utenfor den nærmestliggende ende av den krympede innerhylse (20), hvorefter kopplingsoperasjonen avsluttes ved at en utvendig gjenget, konisk forløpende, rørstusslignende tilkopplingsdel (24) på et endestykke (16), som inngår i kopplingsanordningen, skrues inn i nevnte frie, innvendig gjengede boringsveggsparti av ytterhylsen (18), inntil sistnevntes frie endeplate støter bevegelsesbegrensende mot en ringformet stoppflate (28) ved nevnte tilkopplingsdel (24).

## S a m m e n d r a g

En koplingsanordning (16,24,18,20) for tilkopling av et rør-  
endeparti av et kveilirør (10) omfatter midler (22) for til-  
kopling av et nedihullsutstyr og er bygget opp av tre løse,  
5 parvis sammenskrubare deler hvorav en radialt indre, krympbar  
klemhylse (20) som omsluttet pressende av en langstrakt ytre  
klem- og koplingshylse (18), sikrer fastspenning av kveil-  
rørets (10) endeparti, mens et fritt fremskytende, innvendig  
gjenget ende- parti av ytterhylsen (18) sikrer forbindelsen  
10 med den øvrige del (16,24) av koplingsanordningen ved sammen-  
skruing. For å oppnå en koplingsanordning som foruten å opp-  
vise overlegne strekk-, bøye- og trykkfasthetsegenskaper også  
er velegnet til å ta opp påførte vridningsmomenter, er den  
indre, krympbare klemhylse (20) som har en utvendig, i aksi-  
15 alretningen konisk forløpende mantelflate, forsynt med ytter-  
gjenger som komplementært motsvares av den ytre klem- og kop-  
linghylsens (18) innergjenger som er utformet i den borings-  
avgrensende, indre omkretsflate, som har et i aksialretningen  
konisk forløp, hvis konisitet komplementært svarer til den  
20 indre klemhylses (20) utvendig koniske forløp.

(Fig. 1)

C L A I M S

1. A connector (16,18,20) for the connection of the end  
portion of a pipe, a pipeline, a pipe string or coiled  
tubing (10) and formed or provided with at least one  
connecting device (22) for equipment/tools, preferably  
downhole equipment/tools, said connector (16,18,20)  
comprising parts (16, 18 and 20) that can be screwed  
together and have aligned bores for the accommodation of  
said pipe end portion, which is to be secured in the  
connector in the screwed-together condition of the parts  
(16, 18 and 20), characterized in that a  
radially inner transversally shrinkable adapter sleeve  
(20), which is to bear, in the connected position, by  
its inner circumferential surface in a clamping manner  
against the outer jacket surface of the pipe end portion  
(10), has an external conically extending threaded  
jacket surface, which is formed with a view to  
cooperation with a surrounding outer adapter and  
connector sleeve (18) with an internal conically  
extending threaded circumferential surface, said outer  
adapter and connector sleeve (18) being formed to  
cooperate with a threaded jacket portion of a socket-like  
connecting element (24) formed on an end piece (16) or  
similar, exhibiting said connecting device (22) for  
downhole equipment etc.

2. A connector according to claim 1, characterized  
in that the outer adapter and connector sleeve  
(18) has an axial length that exceeds the double axial  
length of the inner adapter sleeve (20), whose length  
essentially corresponds to the depth of

entering/screwing of the socket-like connecting element (24) into the outer sleeve (18).

3. A connector according to claim 1 or 2, c h a r a c -  
t e r i z e d i n that the connector parts, which can  
5 be screwed together, in the form of the inner sleeve  
(20) and the socket-like connecting element (24) of the  
end piece (16), both have straight cylindrical bores,  
whereas the outer sleeve (18) has a straight cylindrical  
outer jacket, so that the conical extent of each of said  
10 parts (16, 18 and 20) results in a sleeve wall thickness  
decreasing towards one end, the parts cooperating with  
each other two and two, in a total wall thickness  
essentially corresponding to one sleeve wall thickness.

4. A connector according to claim 1, 2 or 3, c h a r a c -  
15 t e r i z e d i n that at the end located the farthest  
from said end piece with the socket (24), the outer  
sleeve (18) is formed with an inward annular flange  
defining a sleeve bore section of a diameter generally  
corresponding to the outer diameter of the coiled  
20 tubing.

5. A connector according to claim 1, 2, 3 or 4, c h a -  
r a c t e r i z e d i n that the inner shrinkable  
adapter sleeve (20) has a threaded, preferably right-  
hand threaded, internal circumferential surface, said  
25 threads being formed with a view to resisting the  
sliding, rotation and/or displacement of the inner  
adapter sleeve (20) on the pipe end portion during and  
after the establishment of the connection.

6. A method of establishing the connection and securing of a pipe end portion (10) to/in a connector (16,18,20) formed in accordance with one or more of the preceding claims, characterized in that externally over a free pipe end portion (10), which is to be connected to and thereby be secured in the connector, is first passed an elongate adapter sleeve (18) with an inner surface extending longitudinally conical, defining the sleeve bore and provided with threads, after which an inner shrinkable adapter sleeve (20) with a threaded jacket surface of an externally conical extent is passed over the pipe end portion (10) and is positioned in the longitudinal direction thereof, after which the outer adapter and connector sleeve (18) is screwed by its internally threaded circumferential surface on the external threaded portion of the inner adapter sleeve (20) and compresses the inner adapter sleeve (20) constantly more during the relative displacement of their cooperating conical surfaces in the longitudinal direction of the connector, whereby the portion of the outer sleeve (18), compressively enclosing the inner sleeve (20), is constantly decreasing in bore diameter in the screwing, at the completion of which a free internally threaded bore wall portion of the outer sleeve (18) projects axially beyond the nearest end of the shrunk inner sleeve (20), after which the connecting operation is completed in that an externally threaded, conically extending socket-like connecting element (24) of an end piece (16) included in the connector, is screwed into said free internally threaded bore wall portion of the outer sleeve (18), until the free end surfaces of the outer sleeve (18) abuts, in a movement-

limiting manner, an annular stop surface (28) by said connecting element (24).

# PATENT COOPERATION TREATY

WO 01/09543  
PCT/NO00/00214

16. -2- 2001

PCT

## NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

From the INTERNATIONAL BUREAU

To:

HÅMSØ, Eivind  
Håmsø Patentbyrå Ans  
Box 171  
N-4302 Sandnes  
NORVÈGE

Date of mailing (day/month/year) 08 February 2001 (08.02.01)		IMPORTANT NOTICE	
Applicant's or agent's file reference P 8593			
International application No. PCT/NO00/00214	International filing date (day/month/year) 22 June 2000 (22.06.00)	Priority date (day/month/year) 12 July 1999 (12.07.99)	
Applicant BAKKE TECHNOLOGY AS et al			

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:

AU,KP,KR,US

In accordance with Rule 47.1(c), third sentence, those Offices will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:

AE,AG,AL,AM,AP,AT,AZ,BA,BB,BG,BR,BY,BZ,CA,CH,CN,CR,CU,CZ,DE,DK,DM,DZ,EA,EE,EP,ES,FI,GB,GD,GE,GH,GM,HR,HU,ID,IL,IN,IS,JP,KE,KG,KZ,LC,LK,LR,LS,LT,LU,LV,MA,MD,MG,MK,MN,MW,MX,MZ,NO,NZ,OA,PL,PT,RO,RU,SD,SE,SG,SI,SK,SL,TJ,TM,TR,TT,TZ,UA,UG,UZ,VN,YU,  
The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this Notice is a copy of the international application as published by the International Bureau on 08 February 2001 (08.02.01) under No. WO 01/09543

### REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, a demand for international preliminary examination must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

### REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))

If the applicant wishes to proceed with the international application in the national phase, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and Volume II of the PCT Applicant's Guide.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer  J. Zahra
Facsimile No. (41-22) 740.14.35	Telephone No. (41-22) 338.83.38

## PATENT COOPERATION TREATY

PCT

From the INTERNATIONAL BUREAU

NOTIFICATION CONCERNING  
SUBMISSION OR TRANSMITTAL  
OF PRIORITY DOCUMENT

(PCT Administrative Instructions, Section 411)

To:

HÅMSØ, Eivind  
Håmsø Patentbyrå Ans  
Box 171  
N-4302 Sandnes  
NORVÈGE

Date of mailing (day/month/year) 27 July 2000 (27.07.00)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference P 8593	
International application No. PCT/NO00/00214	International filing date (day/month/year) 22 June 2000 (22.06.00)
International publication date (day/month/year) Not yet published	Priority date (day/month/year) 12 July 1999 (12.07.99)
Applicant BAKKE TECHNOLOGY AS et al	

1. The applicant is hereby notified of the date of receipt (except where the letters "NR" appear in the right-hand column) by the International Bureau of the priority document(s) relating to the earlier application(s) indicated below. Unless otherwise indicated by an asterisk appearing next to a date of receipt, or by the letters "NR", in the right-hand column, the priority document concerned was submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b).
2. This updates and replaces any previously issued notification concerning submission or transmittal of priority documents.
3. An asterisk(\*) appearing next to a date of receipt, in the right-hand column, denotes a priority document submitted or transmitted to the International Bureau but not in compliance with Rule 17.1(a) or (b). In such a case, the attention of the applicant is directed to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.
4. The letters "NR" appearing in the right-hand column denote a priority document which was not received by the International Bureau or which the applicant did not request the receiving Office to prepare and transmit to the International Bureau, as provided by Rule 17.1(a) or (b), respectively. In such a case, the attention of the applicant is directed to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

<u>Priority date</u>	<u>Priority application No.</u>	<u>Country or regional Office or PCT receiving Office</u>	<u>Date of receipt of priority document</u>
12 July 1999 (12.07.99)	19993437	NO	30 June 2000 (30.06.00)

The International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland

Authorized officer

V. Gross

Facsimile No. (41-22) 740.14.35

Telephone No. (41-22) 338.83.38



-7 -8- 2000

PCT

NOTIFICATION OF RECEIPT OF  
RECORD COPY

(PCT Rule 24.2(a))

From the INTERNATIONAL BUREAU

To:

HÅMSØ, Eivind  
Håmsø Patentbyrå Ans  
Box 171  
N-4302 Sandnes  
NORVÈGE

Date of mailing (day/month/year) 27 July 2000 (27.07.00)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference P 8593	International application No. PCT/NO00/00214

The applicant is hereby notified that the International Bureau has received the record copy of the international application as detailed below.

Name(s) of the applicant(s) and State(s) for which they are applicants:

BAKKE TECHNOLOGY AS (for all designated States except US)  
BAKKE, Stig (for US)

International filing date : 22 June 2000 (22.06.00)

Priority date(s) claimed : 12 July 1999 (12.07.99)

Date of receipt of the record copy  
by the International Bureau : 30 June 2000 (30.06.00)

List of designated Offices :

AP : GH,GM,KE,LS,MW,MZ,SD,SL,SZ,TZ,UG,ZW  
EA : AM,AZ,BY,KG,KZ,MD,RU,TJ,TM  
EP : AT,BE,CH,CY,DE,DK,ES,FI,FR,GB,GR,IE,IT,LU,MC,NL,PT,SE  
OA : BF,BJ,CF,CG,CI,CM,GA,GN,GW,ML,MR,NE,SN,TD,TG  
National : AE,AG,AL,AM,AT,AU,AZ,BA,BB,BG,BR,BY,BZ,CA,CH,CN,CR,CU,CZ,DE,DK,DM,DZ,EE,  
ES,FI,GB,GD,GE,GH,GM,HR,HU,ID,IL,IN,IS,JP,KE,KG,KP,KR,KZ,LC,LK,LR,LS,LT,LU,LV,MA,  
MD,MG,MK,MN,MW,MX,MZ,NO,NZ,PL,PT,RO,RU,SD,SE,SG,SI,SK,SL,TJ,TM,TR,TT,TZ,UA,UG,US,  
UZ,VN,YU,ZA,ZW

## ATTENTION

The applicant should carefully check the data appearing in this Notification. In case of any discrepancy between these data and the indications in the international application, the applicant should immediately inform the International Bureau.

In addition, the applicant's attention is drawn to the information contained in the Annex, relating to:

- ☒ time limits for entry into the national phase  
☐ confirmation of precautionary designations  
☐ requirements regarding priority documents

A copy of this Notification is being sent to the receiving Office and to the International Searching Authority.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer: V. Gross Telephone No. (41-22) 338.83.38
Facsimile No. (41-22) 740.14.35	

## PCT

INFORMATION CONCERNING ELECTED  
OFFICES NOTIFIED OF THEIR ELECTION

(PCT Rule 61.3)

From the INTERNATIONAL BUREAU

To:

HÅMSØ, Eivind  
Håmsø Patentbyrå Ans  
Box 171  
N-4302 Sandnes  
NORVÈGE

Date of mailing (day/month/year) 29 March 2001 (29.03.01)		
Applicant's or agent's file reference P 8593		IMPORTANT INFORMATION
International application No. PCT/NO00/00214	International filing date (day/month/year) 22 June 2000 (22.06.00)	
Priority date (day/month/year) 12 July 1999 (12.07.99)		
Applicant BAKKE TECHNOLOGY AS et al		

1. The applicant is hereby informed that the International Bureau has, according to Article 31(7), notified each of the following Offices of its election:

AP : GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW  
EP : AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE  
National : AU, BG, CA, CN, CZ, DE, IL, JP, KP, KR, MN, NO, NZ, PL, RO, RU, SE, SK, US

2. The following Offices have waived the requirement for the notification of their election; the notification will be sent to them by the International Bureau only upon their request:

EA : AM, AZ, BY, KG, KZ, MD, RU, TJ, TM  
OA : BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG  
National : AE, AG, AL, AM, AT, AZ, BA, BB, BR, BY, BZ, CH, CR, CU, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IN, IS, KE, KG, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MW, MX, MZ, PT, SD, SG, SI, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW

3. The applicant is reminded that he must enter the "national phase" before the expiration of 30 months from the priority date before each of the Offices listed above. This must be done by paying the national fee(s) and furnishing, if prescribed, a translation of the international application (Article 39(1)(a)), as well as, where applicable, by furnishing a translation of any annexes of the international preliminary examination report (Article 36(3)(b) and Rule 74.1).

Some offices have fixed time limits expiring later than the above-mentioned time limit. For detailed information about the applicable time limits and the acts to be performed upon entry into the national phase before a particular Office, see Volume II of the PCT Applicant's Guide.

The entry into the European regional phase is postponed until 31 months from the priority date for all States designated for the purposes of obtaining a European patent.

<p>The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland</p> <p>Facsimile No. (41-22) 740.14.35</p>	<p>Authorized officer: Claudio Borton</p> <p>Telephone No. (41-22) 338.83.38</p>
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**WO 01/09543 A1**

IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**Published:**

— *With international search report.*

**(19) World Intellectual Property Organization  
International Bureau**



**(43) International Publication Date**  
**8 February 2001 (08.02.2001)**

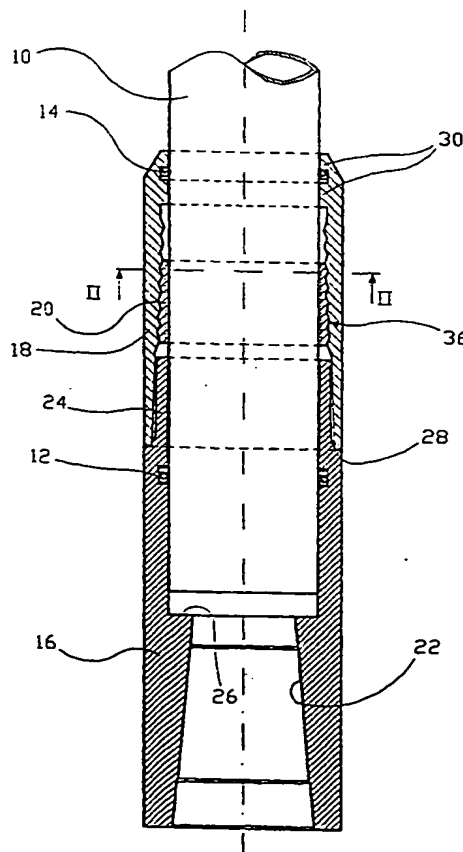
## PCT

**(10) International Publication Number**  
**WO 01/09543 A1**

- (51) International Patent Classification?: F16L 19/065 (74) Agents: HÅMSØ, Eivind et al.: Håmsø Patentbyrå Ans. Box 171, N-4302 Sandnes (NO).
- (21) International Application Number: PCT/NO00/00214
- (22) International Filing Date: 22 June 2000 (22.06.2000) (81) Designated States (*national*): AE, AG, AL, AM, AT, AT (utility model), AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, CZ (utility model), DE, DE (utility model), DK, DK (utility model), DM, DZ, EE, EE (utility model), ES, FI, FI (utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (utility model), SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (25) Filing Language: Norwegian
- (26) Publication Language: English
- (30) Priority Data:  
19993437 12 July 1999 (12.07.1999) NO
- (71) Applicant (*for all designated States except US*): BAKKE TECHNOLOGY AS [NO/NO]; Opstadveien 11, N-4330 Ålgård (NO).
- (72) Inventor; and
- (75) Inventor/Applicant (*for US only*): BAKKE, Stig [NO/NO]; Nesjaberget 9, N-4330 Ålgård (NO).
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, BG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, GM, GN, GU, KE, ML, MR, NE, NG, SN, TD, TG).

[Continued on next page]

- (54) Title: CONNECTOR AND METHOD OF USE OF THE CONNECTOR



(57) Abstract: A connector (16, 24, 18, 20) for the connection of a pipe end portion of coiled tubing (10) comprises means (22) for connecting a piece of downhole equipment, and is formed by three separate parts that can be screwed together two and two, of which a radially inner shrinkable adapter sleeve (20) compressively surrounded by an elongate outer adapter and connector sleeve (18) ensures the securing of the end portion of the coiled tubing (10), whereas a freely projecting, internally threaded end portion of the outer sleeve (18) ensures the connection to the remaining part (16, 24) of the connector in the screwing together. To obtain a connector which, besides exhibiting superior tensile, flexural and compressive strength properties, is also well suited to absorb torques applied, the inner shrinkable adapter sleeve (20), which has an external jacket surface of an axially conical extent, is provided with external threads, complementarily matched by the internal threads of the outer adapter and connector sleeve (18), which are formed in the bore-defining inner circumferential surface, which has a conical extent in the axial direction, its concavity complementarily corresponding to the externally conical extent of the inner adapter sleeve (20).

**WO 01/09543 A1**



IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**Published:**

— *With international search report.*



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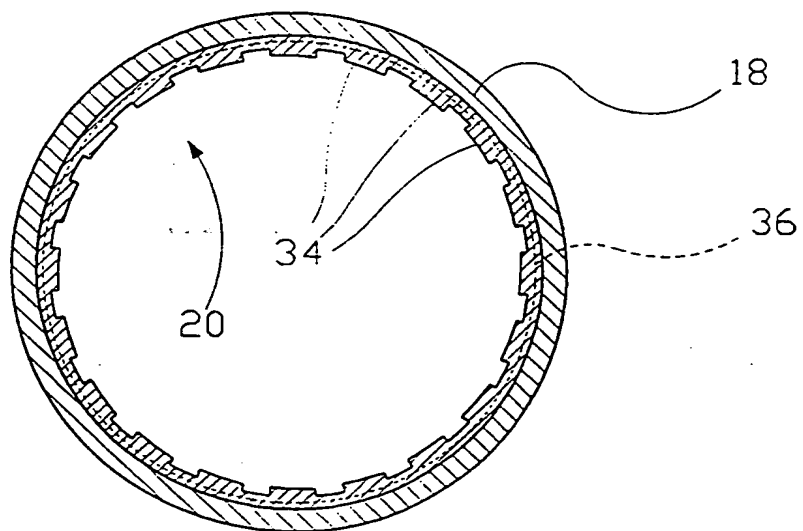


FIG. 2

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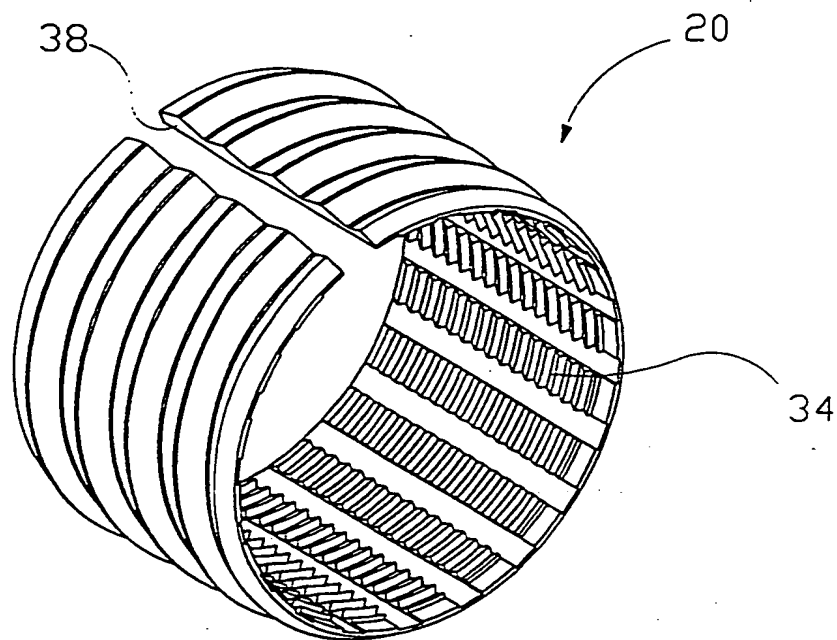
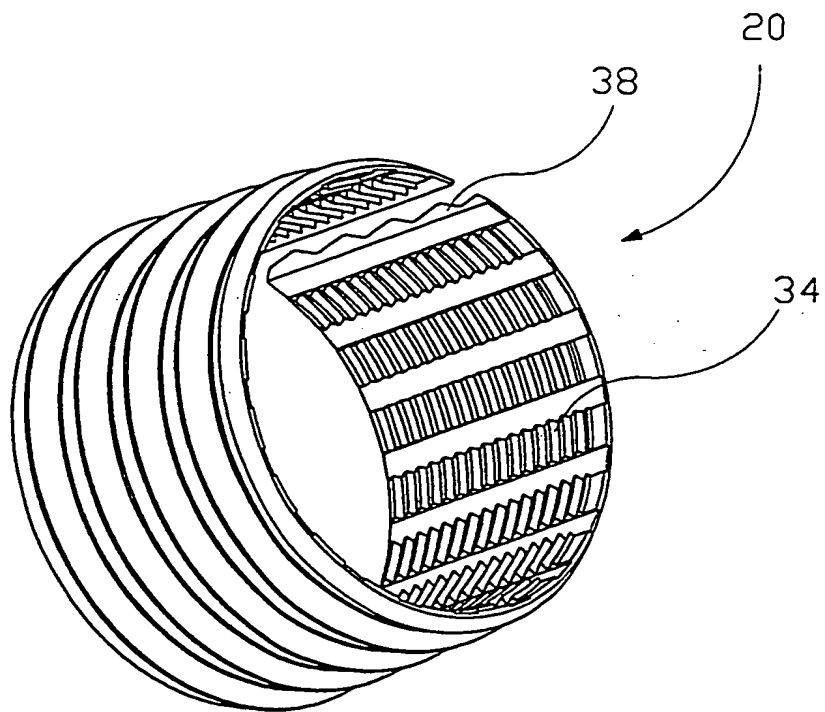


FIG. 3





## INTERNATIONAL SEARCH REPORT

International application No.

PCT/NO 00/00214

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: F16L 19/065

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: F16L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 3248135 A (R.B. MERIPOL), 26 April 1966 (26.04.66), figures 1,2,5 --	1,2,4
Y	US 3471181 A (F. FUENTES), 7 October 1969 (07.10.69), figures 2-4, abstract --	1,2,4
Y	US 3972547 A (ITOYA), 3 August 1976 (03.08.76), figures 12-14, abstract --	1,2,4
A	US 2350017 A (E.W. DAVIS), 30 May 1944 (30.05.44) -- -----	

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

## \* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
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- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
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"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search

18 October 2000

Date of mailing of the international search report

26 -10- 2000

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**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

03/10/00

International application No.  
PCT/NO 00/00214

Patent document cited in search report			Publication date	Patent family member(s)	Publication date
US	3248135	A	26/04/66	NONE	
US	3471181	A	07/10/69	NONE	
US	3972547	A	03/08/76	NONE	
US	2350017	A	30/05/44	NONE	

## CONNECTOR AND METHOD OF USE OF THE CONNECTOR

This invention relates to a connector for the connection of the outer end portion of a pipe, a pipe line, a pipe string or coiled tubing, the connector moreover being formed for the connection of at least one piece of downhole equipment, a downhole tool etc., e.g. a drill bit, a drive engine for same, a measuring instrument etc. to carry out drilling, downhole operations or measuring, which connector comprises connectable parts for the connecting and securing of the pipe end portion, including an inner adapter sleeve and an outer adapter and connector sleeve, which can be connected to the connecting element of an end piece/connecting piece.

Also, the invention relates to a method of establishing the connection and securing the pipe end portion to the connector.

For connecting pieces for coiled tubing it is important, for space reasons, to allow the external diameter to be kept as small as possible, and it is also important that the

connecting piece can stand high tensile loads, high pressure loads and the effect of high torques.

Existing connectors of this kind normally comprise an adapter sleeve with an externally conical smooth surface. Such an adapter sleeve with a smooth non-threaded surface will cause a great expansive force on an external adapter and connector sleeve surrounding the adapter sleeve, when the connector is subjected to tensile load. This disadvantageous condition is normally compensated for by increasing the external diameter of the connector, which is also unfortunate and disadvantageous.

A smooth conical adapter sleeve bearing against the surrounding end portion of coiled tubing, can only absorb a highly limited torque.

Existing connectors are generally locked by set screws meant to have the task of absorbing torques. This is a particularly unfortunate construction as such screws are completely unsuitable for such a task, and may, at worst, come loose through vibrations, and may fall out, after which the loose set screws may cause damage to the well and downhole equipment.

Therefore, the objective of the present invention has been to remedy or reduce, to a substantial degree, by simple means the drawbacks, disadvantages and limitations of use of conventional connectors of this kind and of other known connectors of similar types, and thus provide a connector for the purposes in question, in which the external diameter is kept as small as possible, and which exhibits, with

dimensions corresponding to those of known connectors, a higher tensile and compressive strength and greater resistance towards external torques applied thereto.

A connector of the kind indicated in the introductory part of claim 1, distinguishes itself from conventional and other known couplings through the features comprised by the characterizing part of claim 1.

As opposed to the state of the art, the adapter sleeve of the connector according to the invention has an external conical shape and is provided with external threads (normally left-hand threads), and, on the internal cylindrical surface opposite the coiled tubing, with friction-creating ribs, preferably in the form of (right-hand) threads.

This adapter sleeve is split and can be shrunk around the coiled tubing by means of the outer adapter and connector sleeve formed with a conical threaded inner surface complementarily corresponding to the conicity of the adapter sleeve. The sleeve wall of this outer adapter and connector sleeve is tapering gradually in the direction of the end piece incorporated in the connector, and can be screwed to the socket-like connecting element of said end piece, said connecting element having an externally conical sleeve wall tapering towards its free end, complementarily corresponding to the conicity of the outer sleeve, with external threads.

The socket-like connecting element of the end piece normally has a smooth cylindrical bore of a diameter insignificantly exceeding the outer diameter of the coiled tubing.

The diameter of the internally threaded bore of the outer sleeve exceeds, over almost the entire length thereof, the diameter of the coiled tubing, i.e. apart from an end portion positioned at maximal distance from said end piece, wherein the external sleeve is formed with an annular inward flange of a comparatively large axial extent and of a diameter which only insignificantly exceeds the outer diameter of the coiled tubing.

In this annular flange end portion is formed a circumferential groove which is open in the radially inward direction, and which accommodates a seal in the form of an O-ring. Another annular seal in the form of an O-ring is inserted in an internal circumferential groove formed in the socket-like connecting element in a position closer to the end piece than the position of an annular shoulder portion forming a stop and abutment surface for the end surface of the outer sleeve in the screwed together condition.

Due to the mutually cooperating, complementarily conical surfaces and sleeve walls tapering in opposite directions, the screwed-together outer elements, an outer adapter and connector sleeve and the socket-like connecting piece of the end piece, will together exhibit a minimal external diameter.

At the internal "ribs" of the inner, externally conical adapter sleeve, preferably in the form of right-hand threads, said right-hand threads will resist displacement of the inner sleeve and "bite" into the surface of the coiled tubing.

The externally conical adapter sleeve with external left-hand threads, incorporated in the connector according to the

invention, will be capable of adopting torques, and the torque applied will tighten the inner adapter sleeve even more firmly to the external wall surface of the coiled tubing.

5 By high tensile loads the expansive forces will not be correspondingly high as when the inner adapter sleeve from known technique is externally smooth. By compressive forces the inner shrinkable adapter sleeve will tighten on the surrounding portion of the coiled tubing.

10 In the connecting of the coiled tubing, including securing thereof, and in the joining/screwing together of the different parts of the connector in the establishing of the connection, the procedure is preferably as follows:

The outer adapter and connector sleeve is passed over the end  
15 portion of the coiled tubing, so that its inward annular flange with the O-ring is the farthest from the end of the coiled tubing, so that the tapering of the sleeve wall towards the free end thereof, is pointing in the same direction as the free end portion of the coiled tubing.

20 As to the positioning of the outer adapter and connector sleeve on the coiled tubing, it is ensured that its free end, where the wall thickness is at its smallest, will be located at a relatively large distance from the end of the coiled tubing. Then the inner split shrinkable externally conical  
25 adapter sleeve with external threads is passed over the coiled tubing. The internal right-hand threads of the inner adapter sleeve act as friction-creating "ribs", and resist gliding of the inner adapter sleeve through

rotation/displacement externally on the coiled tubing (also in the condition of use, when exposed to external forces).

Then the outer adapter and connector sleeve is screwed, by its internally conical threaded portion, along the externally  
5 conical threaded surface of the internal adapter sleeve, complementarily corresponding the conicity of the outer sleeve, and - as the inner diameter of the threads of the outer sleeve decreases - the inner shrinkable sleeve is compressed transversally thereby transferring compressive  
10 forces from the outer sleeve to the coiled tubing, which is thereby secured. When an optimal degree of securing has been achieved, the outer sleeve has, from its free end, a free (not in threaded engagement with the inner adapter sleeve) internally conical threaded end portion, which - on  
15 adjustment, according to experience, of the position of the inner adapter sleeve relative to the end of the coiled tubing in the position of use - shall have a larger axial longitudinal extent than the dept of entering (depth of screwing) of the socket-like connecting element of the end  
20 piece, extending over said depth of entering, conically narrowing towards its free end.

In this position the socket-like connecting element of the end piece is screwed into said free internally threaded connecting portion of the outer sleeve, up to an annular  
25 movement-limiting abutment shoulder defining the socket-like connecting element innermost by the end piece, and determining its depth of entering into the outer sleeve.

Thereby the connection is established, and the end piece may be connected to a piece of downhole equipment, for example a



tool, a drill bit, an engine, an instrument, a measuring device etc. whose kind is not an object of the present invention.

A non-limiting example of a present preferred embodiment will be explained in the following with reference to the accompanying drawings, in which:

Fig. 1 shows an axial section through a connector according to the invention with the end portion of coiled tubing secured therein;

Fig. 2 shows a cross-section through an inner and an outer adapter sleeve in the screwed-together position, corresponding to the established connection according to the sectional plane II-II of Fig. 1; and

Fig. 3 shows a perspective view of said inner adapter sleeve which is split longitudinally and can be shrunk transversally.

A connector for the connection of the end portion of a pipe, a pipeline, a pipe string or coiled tubing 10 comprises (besides the seals 12 and 14 in the form of O-rings positioned in internal circumferential grooves in the connector parts 16 and 18, which can be screwed together) three parts 16, 18 and 20 that can be screwed together.

A first part included in the connector has the form of an end piece 16 with an internally threaded conical bore 22 for the connection of downhole equipment/tools and a connecting socket 24 for the coiled tubing. The connecting socket 24 is

externally conical and provided with external threads. Internally the socket 24 is cylindrical, so that the pipe wall is narrowing towards its free end.

The end piece 16 has a first, internal annular shoulder surface 26, which forms an abutment surface for the end surface of the coiled tubing 10. In an axial distance from this internal, annular abutment surface 26 the externally conical threaded socket-like connecting element 24 is defined by an, axially seen, annular shoulder surface 28 determining the dept of entering/screwing of the connecting element 24 into an outer adapter and connector sleeve 18 forming the second part of the connector.

The second part of the connector, in the form of an outer adapter and connector sleeve 18, is formed by an adapter sleeve element of an internally conical shape with an externally straight cylindrical jacket surface, so that the sleeve wall decreases successively in thickness towards the end which is directed towards the end piece 16, whereby the threaded internal wall defining the bore through the outer adapter and connector sleeve 18, decreases in diameter in the direction away from the end piece 16. At that end, which is positioned at the largest distance from the end piece 16, the outer adapter and connector sleeve 18 is formed with an inward annular flange 30, whose diameter mainly corresponds to the outer diameter of the coiled tubing 10.

Internally in this annular flange end portion is formed an annular circumferential groove which accommodates a first seal in the form of an O-ring 14. At a certain axial distance from the seal 14 and internally in the end piece 16 is formed

a circumferential groove for a second seal in the form of an O-ring 12.

The third part of the connector is formed by an inner externally conical and threaded adapter sleeve 20, which is shown in perspective in Fig. 3, in cross-section in Fig. 2 and in longitudinal section in Fig. 1.

This internal externally conical adapter sleeve 20 (internally exhibiting a straight cylindrical inner wall surface defining a bore) has a sleeve wall narrowing in the direction away from the end piece 16.

The conicity and threading of the inner adapter sleeve 20 complementarily corresponds to the conicity and threading of the outer adapter and connector sleeve 18. The same applies to the conicity and threading of the socket-like connecting element 24.

The inner adapter sleeve 20 preferably has external left-hand threads and may internally be formed - as a kind of ribs or other friction-creating/displacement-resisting projections opposite the surface of the coiled tubing 10 - with (right-hand) threads 34 which will efficiently resist sliding of the inner adapter sleeve 20 on the coiled tubing 10 on rotation/displacement (in Fig. 2 the coiled tubing 10 has been left out for clarity). Here, cooperating threads on the outer and inner sleeves 18, 20 are identified by the common reference number 36.

The inner adapter sleeve 20 has a through slot 38, which will, together with specially selected spring steel or

similar, make the adapter sleeve 20 shrinkable in the transversal direction when radial/transversal compressive forces are applied thereto by the outer sleeve 18 as a consequence of relative displacing movement of conical surfaces bearing on one another.

By the connection of the end portion of the coiled tubing 10, i.e. the outer portion which can be accommodated in the axial direction in the connector, the end surface of the coiled tubing 10 is abutting the axially innermost annular abutment surface 26.

The outer adapter and connector sleeve 18 is first passed over the coiled tubing 10 from the free end thereof, until this outer sleeve 18 adopts a position along the coiled tubing 10, in which its left-hand end of a minimal sleeve wall thickness is positioned at an axial distance from the outer free end of the connecting socket 24, said distance exceeding the axial length of the inner adapter sleeve 20.

Then the inner split, radially shrinkable adapter sleeve 20 is pushed and is brought to an initial position with its left-hand end at a suitable (experience will reveal how much this inner adapter sleeve can be expected to be moved axially by the displacing movement of the outer adapter sleeve towards the left during the engagement and displacement of its conical internal threads with/along the cooperating conical external threads of the inner adapter sleeve 20), whereas the constantly decreasing diameter of the bore of the outer sleeve effects a radial compression, transversal "shrinkage", of the inner adapter sleeve, whose compressive

forces ensure the securing of the surrounding annular portion of coiled tubing.

It is assumed that the inner adapter sleeve 20 is firmly connected and secured in a position, in which its left-hand end, according to Fig. 1, is positioned at an axial distance from the left-hand end of the outer adapter and connector sleeve 18, said distance exceeding the effective axial length of the connecting socket 24, so that said connecting socket 24 may now be screwed into the free (without the inner adapter sleeve 20 positioned radially within) end portion, until the free end surface of the connecting socket 24 abuts, in a movement-stopping manner, the, axially seen, outer annular abutment surface 28 of the end piece 16 limiting the depth of entering/screwing of the externally conical threaded connecting socket 24. Thereby the connection is established.

## C L A I M S

1. A connector (16,18,20) for the connection of the end portion of a pipe, a pipeline, a pipe string or coiled tubing (10) and formed or provided with at least one connecting device (22) for equipment/tools, preferably downhole equipment/tools, said connector (16,18,20) comprising parts (16, 18 and 20) that can be screwed together and have aligned bores for the accommodation of said pipe end portion, which is to be secured in the connector in the screwed-together condition of the parts (16, 18 and 20), characterized in that a radially inner transversally shrinkable adapter sleeve (20), which is to bear, in the connected position, by its inner circumferential surface in a clamping manner against the outer jacket surface of the pipe end portion (10), has an external conically extending threaded jacket surface, which is formed with a view to cooperation with a surrounding outer adapter and connector sleeve (18) with an internal conically extending threaded circumferential surface, said outer adapter and connector sleeve (18) being formed to cooperate with a threaded jacket portion of a socket-like connecting element (24) formed on an end piece (16) or similar, exhibiting said connecting device (22) for downhole equipment etc.

2. A connector according to claim 1, characterized in that the outer adapter and connector sleeve (18) has an axial length that exceeds the double axial length of the inner adapter sleeve (20), whose length essentially corresponds to the depth of

entering/screw wing of the socket-like connecting element (24) into the outer sleeve (18).

3. A connector according to claim 1 or 2, characterized in that the connector parts, which can  
5 be screwed together, in the form of the inner sleeve (20) and the socket-like connecting element (24) of the end piece (16), both have straight cylindrical bores, whereas the outer sleeve (18) has a straight cylindrical outer jacket, so that the conical extent of each of said  
10 parts (16, 18 and 20) results in a sleeve wall thickness decreasing towards one end, the parts cooperating with each other two and two, in a total wall thickness essentially corresponding to one sleeve wall thickness.
4. A connector according to claim 1, 2 or 3, characterized in that at the end located the farthest  
15 from said end piece with the socket (24), the outer sleeve (18) is formed with an inward annular flange defining a sleeve bore section of a diameter generally corresponding to the outer diameter of the coiled  
20 tubing.
5. A connector according to claim 1, 2, 3 or 4, characterized in that the inner shrinkable  
25 adapter sleeve (20) has a threaded, preferably right-hand threaded, internal circumferential surface, said threads being formed with a view to resisting the sliding, rotation and/or displacement of the inner adapter sleeve (20) on the pipe end portion during and after the establishment of the connection.

6. A method of establishing the connection and securing of a pipe end portion (10) to/in a connector (16,18,20) formed in accordance with one or more of the preceding claims, characterized in that externally  
5 over a free pipe end portion (10), which is to be connected to and thereby be secured in the connector, is first passed an elongate adapter sleeve (18) with an inner surface extending longitudinally conical, defining the sleeve bore and provided with threads, after which  
10 an inner shrinkable adapter sleeve (20) with a threaded jacket surface of an externally conical extent is passed over the pipe end portion (10) and is positioned in the longitudinal direction thereof, after which the outer adapter and connector sleeve (18) is screwed by its  
15 internally threaded circumferential surface on the external threaded portion of the inner adapter sleeve (20) and compresses the inner adapter sleeve (20) constantly more during the relative displacement of their cooperating conical surfaces in the longitudinal  
20 direction of the connector, whereby the portion of the outer sleeve (18), compressively enclosing the inner sleeve (20), is constantly decreasing in bore diameter in the screwing, at the completion of which a free internally threaded bore wall portion of the outer  
25 sleeve (18) projects axially beyond the nearest end of the shrunk inner sleeve (20), after which the connecting operation is completed in that an externally threaded, conically extending socket-like connecting element (24) of an end piece (16) included in the connector, is  
30 screwed into said free internally threaded bore wall portion of the outer sleeve (18), until the free end surfaces of the outer sleeve (18) abuts, in a movement-



limiting manner, an annular stop surface (28) by said connecting element (24).

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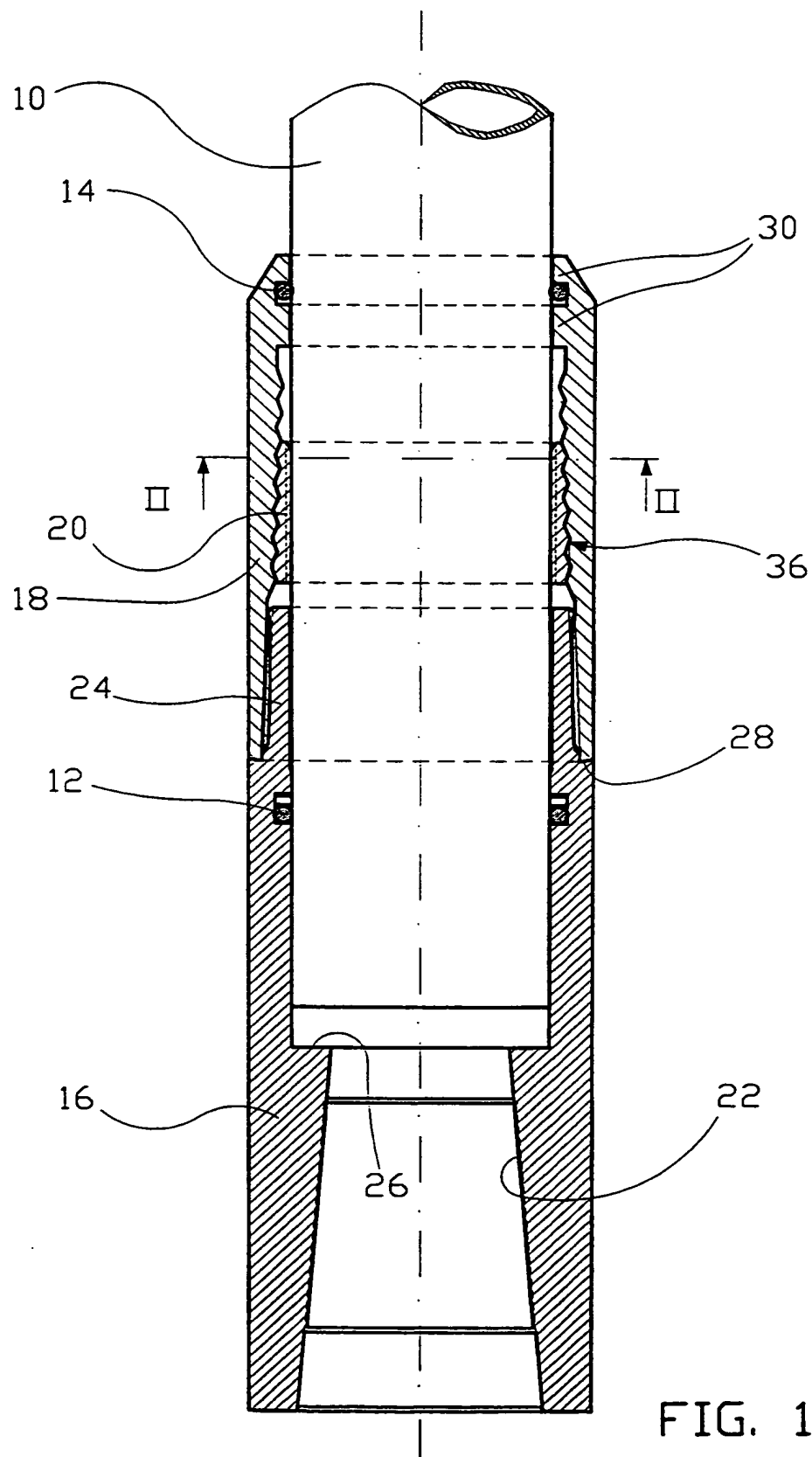


FIG. 1

2/3

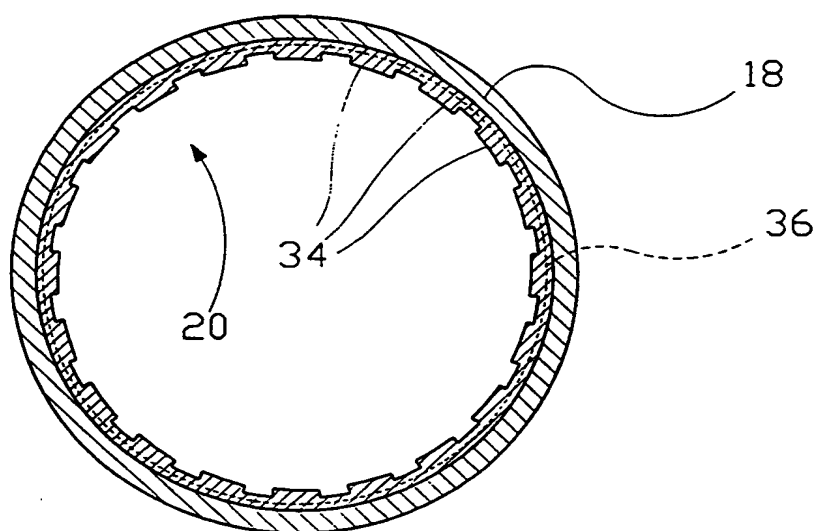


FIG. 2

3/3

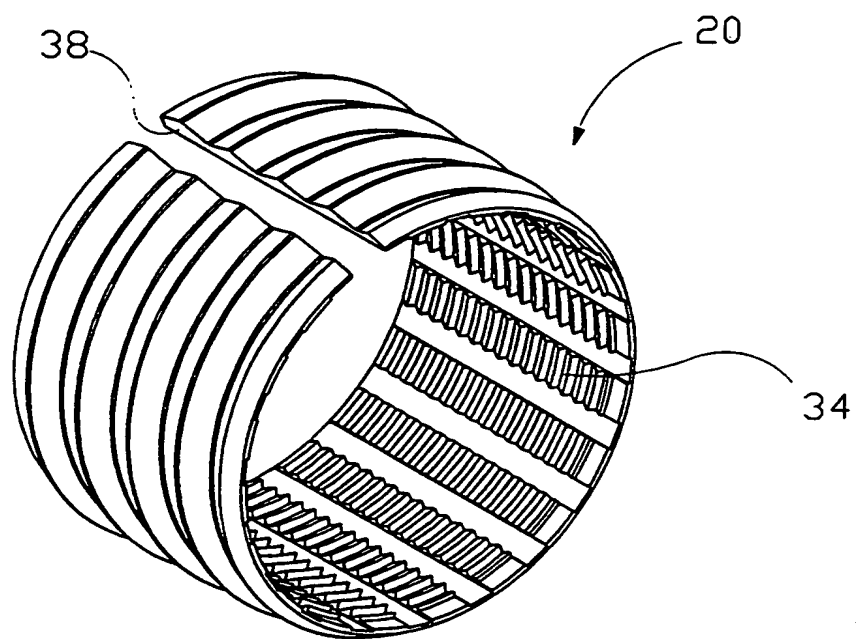
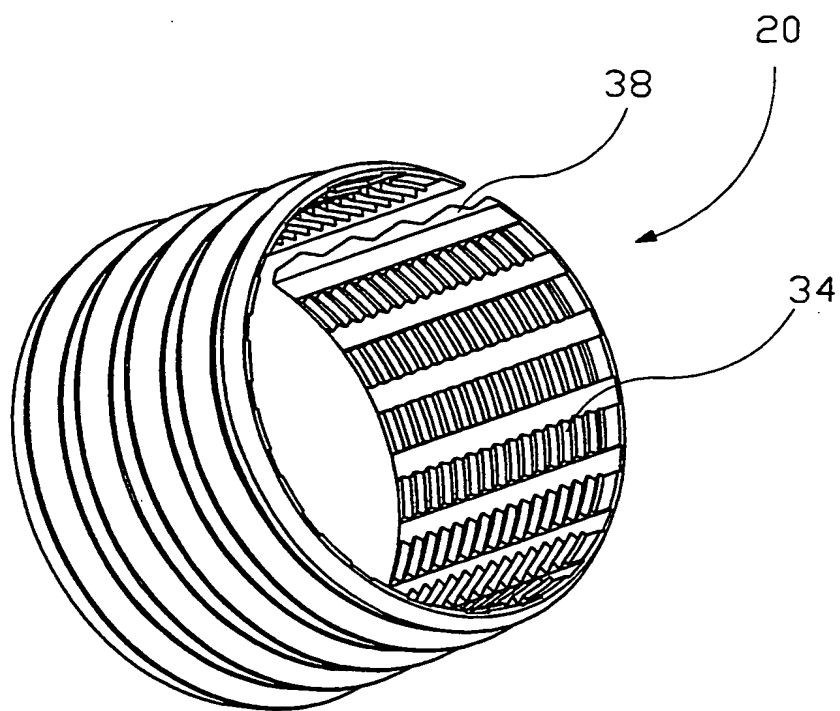


FIG. 3



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International application No.  
PCT/NO 00/00214

## A. CLASSIFICATION OF SUBJECT MATTER

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Date of the actual completion of the international search

18 October 2000

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Date of mailing of the international search report

26-10-2000

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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

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International application No.

PCT/NO 00/00214

Patent document cited in search report			Publication date	Patent family member(s)	Publication date
US	3248135	A	26/04/66	NONE	
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US	3972547	A	03/08/76	NONE	
US	2350017	A	30/05/44	NONE	